S17.OC.01

Spatial and temporal variability of plant-available soil water in Congo Basin and its relationship with tree species distributions

Rabaud S[1], Freycon V[1], Gond V[1], Mortier F[1], Fayolle A[2], Gourlet-Fleury S[1] - [1]CIRAD - UPR BSEF, [2]Université de Liège - Gembloux Agro-Bio Tech

Regional-scale patterns of tropical rainforest tree composition can be due to climate (rainfall, dry season length), geology and/or soil properties (chemical fertility, available water). In Amazonia, soil fertility and dry season length appears to be the main factor to explain this pattern. However, in the Congo Basin, geology has been proposed to explain the pattern of some commercial timber species. Since the geological substrates of this area have similar chemical properties, we hypothesized that this pattern could be explained by the plant-available soil water (PAW).
We used a soil water balance model similar to RisQue in the Congo Basin over the period from 2000 to 2010, with a decade time step, and with a spatial resolution of 8 km. The input parameters of this model were the maximum plant-available soil water (PAWmax), rainfall and evapotranspiration. The output parameter was the maximum number of successive decades when PAW was null, named extreme drought index (EDI). Finally we carried out a map of EDI at Congo Basin scale that we compared with maps of the spatial pattern of 31 commercial species.
We showed that Arenosols, as expected, but also other soils like Ferralsols, have the lowest PAWmax of the Congo Basin. We evidenced no or low correlations between the map of EDI and maps of the spatial pattern of each of the 31 commercial species. Other factors, not taken into account in this study, might explain this result like the water table level and variable forest rooting depth in function of soil type.